

Appl. S.N.: 10/674,117
Reply to Office Action of July 3, 2007

RD-29557-5

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Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An article cleaning apparatus for performing a solvent cleaning process that utilizes a cyclic siloxane solvent based cleaning fluid comprising:

an air management mechanism;

a cleaning basket assembly;

a fluid regeneration device, said fluid regeneration device including a cleaning fluid regeneration adsorption media that contains a portion of solvent based cleaning fluid to replace the solvent based cleaning fluid consumed;

a working fluid device coupled to said fluid regeneration device, said cleaning basket assembly, and said air management mechanism;

a clean fluid device coupled to said cleaning basket assembly and said fluid regeneration device;

a controller coupled to said air management mechanism, said cleaning basket assembly, said working fluid device, said fluid regeneration device, and said clean fluid device, wherein said controller controls the solvent cleaning process that utilizes a solvent based cleaning fluid comprising a cyclic siloxane solvent; and

a solvent contaminant detection device coupled to the fluid regeneration device that determines an amount of a contaminant accumulated in the solvent using an electromagnetic source and an electromagnetic detector responsive to absorbance of electromagnetic radiation by the contaminant.

2. (previously amended) The article cleaning apparatus of claim 1 wherein said electromagnetic source is an ultraviolet source and said electromagnetic detector is an ultraviolet detector.

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3. (previously amended) The article cleaning apparatus of claim 1 wherein said electromagnetic source is an infrared source and said electromagnetic detector is an infrared detector.

4. (previously amended) The article cleaning apparatus of claim 1 wherein said solvent contaminant detection device comprises an ultraviolet source, a flow-through cell for passing samples of the solvent from the fluid regeneration device, and an ultraviolet detector responsive to ultraviolet radiation radiated from the ultraviolet source through the flow-through cell.

5. (previously amended) The article cleaning apparatus of claim 4 wherein said solvent contaminant detection device further comprises a filter that passes ultraviolet frequencies in a bandpass responsive to at least one contaminant likely to accumulate in the solvent.

6. (previously amended) The article cleaning apparatus of claim 5 wherein said at least one contaminant comprises a family of contaminants.

7. (previously amended) The article cleaning apparatus of claim 1 wherein said solvent contaminant detection device is coupled to the controller to generate a signal when a concentration of contaminants in the solvent reaches a predefined limit.

8. (previously amended) The article cleaning apparatus of claim 7 wherein said predefined limit indicates degradation in a regeneration adsorption media in said fluid regeneration device.

9. (previously amended) The article cleaning apparatus of claim 1 further comprising a turbidity sensor to detect particulates in the solvent that are readily visible, and said solvent contaminant detection device detects dissolved contaminants in the solvent that are not readily visible.

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10-17. (Cancelled)

18. (currently amended) An article cleaning apparatus comprising:
a controller that controls a solvent cleaning process that utilizes a solvent based cleaning fluid comprising a cyclic siloxane solvent; and
a fluid regeneration device that includes a cleaning fluid regeneration adsorption media that contains a portion of solvent based cleaning fluid to replace solvent based cleaning fluid consumed;
a solvent contaminant detection device that detects dissolved contaminants in the solvent using an electromagnetic source and an electromagnetic detector responsive to absorbance of electromagnetic radiation by the dissolved contaminants, and is coupled to the controller to generate a signal indicative of when to replace the regeneration adsorption media that purifies the cleaning fluid in response to detecting the dissolved contaminants.

19. (original) The article cleaning apparatus of claim 18 wherein the dissolved contaminants include fatty acids and esters that are not readily visible, the electromagnetic source is an ultraviolet source and the electromagnetic detector is an ultraviolet detector that is responsive to ultraviolet radiation in a spectral band where the absorbance of the ultraviolet radiation by the dissolved fatty acids and esters has a substantially linear relationship to a concentration of the dissolved fatty acids and esters in the solvent.

20. (original) The article cleaning apparatus of claim 18 further comprising a display that notifies an operator to replace the regeneration adsorption media in response to the signal.

21. (currently amended) A dry cleaning apparatus comprising:
a cleaning basket assembly that holds articles that are cleaned by a cleaning fluid that includes a solvent;

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an air management mechanism that provides air intake and air outtake for the cleaning basket assembly;

a fluid regeneration device that purifies the solvent and includes a cleaning fluid regeneration adsorption media that contains a portion of solvent based cleaning fluid to replace solvent based cleaning fluid consumed; and

a solvent contaminant detector that detects dissolved contaminants in the solvent by measuring absorbance of ultraviolet or infrared radiation by the dissolved contaminants.

22. (original) The apparatus of claim 21 wherein the cleaning fluid includes a cyclic siloxane solvent.

23. (original) The apparatus of claim 21 wherein the cleaning fluid passes sequentially through the fluid regeneration device and the solvent contaminant detector.

24. (original) The apparatus of claim 21 wherein the dissolved contaminants are fatty acids and esters.

25. (original) The apparatus of claim 21 wherein the dissolved contaminants are not readily visible.

26. (original) The apparatus of claim 21 wherein the solvent contaminant detector measures absorbance of ultraviolet radiation by the dissolved contaminants.

27. (original) The apparatus of claim 26 wherein the solvent contaminant detector measures the absorbance of the ultraviolet radiation in a spectral band where the absorbance of the ultraviolet radiation is proportional to a concentration of the dissolved contaminants in the solvent.

28. (original) The apparatus of claim 26 wherein the solvent contaminant detector measures the absorbance of the ultraviolet radiation in a spectral band

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where the absorbance of the ultraviolet radiation has a substantially linear relationship to a concentration of the dissolved contaminants in the solvent.

29. (original) The apparatus of claim 26 wherein the solvent contaminant detector measures the absorbance of the ultraviolet radiation in a spectral band from about 200 nm to about 350 nm.

30. (original) The apparatus of claim 26 wherein the solvent contaminant detector measures the absorbance of the ultraviolet radiation in spectral bands situated at 220-230 nm and 270-280 nm.

31. (original) The apparatus of claim 26 wherein the solvent contaminant detector measures the absorbance of the ultraviolet radiation in spectral bands situated at approximately 223 nm and 274 nm.

32. (original) The apparatus of claim 21 wherein the apparatus notifies an operator in response to the dissolved contaminants exceeding a predetermined concentration.

33. (original) The apparatus of claim 32 wherein the apparatus notifies the operator to replace a regeneration cartridge in the fluid regeneration device, and the regeneration cartridge includes a cleaning fluid regeneration adsorption media.

34. (original) The apparatus of claim 21 wherein the apparatus includes a working fluid device that passes the cleaning fluid and discharges water, and the cleaning fluid passes sequentially through the working fluid device, the fluid regeneration device and the solvent contaminant detector.

35. (original) The apparatus of claim 21 wherein the fluid processing mechanism includes a clean fluid device that provides a storage tank for the cleaning fluid, and the cleaning fluid passes sequentially through the fluid regeneration device, the solvent contaminant detector and the clean fluid device.

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36. (original) The apparatus of claim 21 wherein the apparatus includes an optical turbidity sensor that detects readily visible particulates in the solvent.

37. (original) The apparatus of claim 21 wherein the apparatus includes a solvent sensor that detects the cleaning fluid in an airflow that circulates between the air management mechanism and the cleaning basket assembly.

38. (original) The apparatus of claim 21 wherein the apparatus includes first and second regeneration cartridges, and the cleaning fluid passes sequentially through the first regeneration cartridge, the solvent contaminant detector and the second regeneration cartridge.

39. (original) The apparatus of claim 38 wherein the first regeneration cartridge is removed, the second regeneration cartridge replaces the first regeneration cartridge and a third regeneration cartridge replaces the second regeneration cartridge in response to the dissolved contaminants exceeding a predetermined concentration.

40-45. (Cancelled)